

## REPORT

# BALLISTIC TRAJECTORY

## The Evolution of North Korea's Ballistic Missile Market

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*North Korea has been one of the world's most active suppliers of ballistic missile systems since the mid-1980s, but the nature of its missile export business has changed significantly during this period. Unclassified, publicly available data show that the great majority of known deliveries of complete missile systems from North Korea occurred before 1994. The subsequent fall-off took place a decade too early to be explained by the Proliferation Security Initiative of 2003. It can be explained by a combination of factors that have reduced demand. First, after selling production equipment for ballistic missiles to many states, especially in the Middle East, North Korea by the late 1990s had become primarily a supplier of missile parts and materials, not complete systems. Second, after Operation Desert Storm, some missile-buying states shifted their attention away from ballistic missiles in favor of manned aircraft, cruise missiles, and missile defense systems supplied by Western powers. Third, some states experienced pressure from the United States to curtail their dealings with North Korea. During the last decade, having shed most of its previous customer base, North Korea has entered a phase of collaborative missile development with a smaller number of state partners, particularly Iran and Syria. Its known sales of complete missile systems are relatively small and infrequent. North Korea's time as missile supplier to the Middle East at large has ended, but there is a risk that regional states will turn to North Korea as a supplier of nuclear technology in the future.*

KEYWORDS: North Korea; Middle East; proliferation; ballistic missiles; exports

According to its official news agency, the Democratic People's Republic of Korea has had two reasons to produce ballistic missiles: for national defense, and to acquire much-needed foreign currency.<sup>1</sup> Ballistic missile sales are often described as a major source of income for North Korea, but a careful examination of the available data shows that North Korea has shipped relatively few complete missile systems after 1993, turning instead to the export of missile components and materials. In the last decade, furthermore, the components-and-materials trade also seems to have slackened. In contrast to its earlier pattern of selling complete systems to a wide array of customers, North Korea now appears to be collaborating in the development of new missiles with a small number of foreign partners. Based on recent interdictions of arms shipments, North Korea's military exports now consist primarily of conventional weapons, not ballistic missiles, shipped to various destinations in the Middle East and Africa.

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The main commonality between the three periods of North Korea's foreign dealings in missile technology is geographic: most of North Korea's opportunities to sell or co-develop ballistic-missile technology have been found in the Middle East. But this observation cannot overshadow the extent of the change. Over the years, complete missile systems from North Korea reached Iran, Egypt, Syria, Libya, Yemen, the United Arab Emirates, and also Pakistan; Pyongyang now deals primarily with Iran and Syria in the area of missiles. While the earlier group of missile buyers included both Western-oriented states and their opponents, the current partners are, like North Korea itself, revolutionary states, relatively isolated from the world community.

A reconstruction of missile deliveries based on unclassified, publicly available US government data shows that more than 40 percent of the roughly 1,200 theater ballistic missile systems supplied to the developing world between 1987 and 2009 came from North Korea. Nearly 90 percent of units from all suppliers were delivered in just the first third of this period, from 1987 to 1993; more than 80 percent of North Korea's total units were delivered during these same years. Table 1 shows the pattern of ballistic missile deliveries to the developing world by year, seller, and region.

No comparable public dataset exists for deliveries of North Korean missile components, materials, or manufacturing equipment; however, news and other reports can provide some insight into these transfers. Accounts of seized shipments or related criminal prosecutions should be considered more reliable than rumors or suspicions. Table 2 shows how interdictions of North Korean shipments of ballistic missiles, components, materials, or production equipment (or related law enforcement actions) have risen and fallen over the last three decades, compared to other types of arms shipments.

**TABLE 1**

Reconstruction of deliveries of ballistic missile systems to developing nations, 1987–2009.

Year	From Russia	Supplied to	From China	Supplied to	From N. Korea	Supplied to	Total
2009	10	Middle East	–		–		10
2008	–		–		–		0
2007	–		–		–		0
2006	–		–		10	Middle East	10
2005	–		–		20	Middle East	20
2004	–		–		–		0
2003	–		–		10	Middle East	10
2002	–		–		20	Middle East	20
2001	–		–		10	Middle East	10
2000	40	Sub-Saharan Africa	–		–		40

1999	–		–		20	Middle East	20
1998	–		–		–		0
1997	–		–		–		0
1996	–		–		10	Asia	10
1995	–		–		–		0
1994	–		–		–		0
1993	–		–		30	Middle East	30
1992	–		30	Asia	80	Middle East	110
1991	0 (150)	Asia	80	Middle East	60	Middle East	140
1990	0 (230)	Asia	60	Middle East	40	Middle East	100
1989	0 (1,280)	Asia	70	Middle East	40	Middle East	110
1988	120	Middle East	30	Middle East	150	Middle East	300
1987	230	Middle East	–		20	Middle East	250
<b>Total</b>	<b>400</b>		<b>270</b>		<b>510</b>		<b>1,180</b>

Notes: “Asia” includes Afghanistan and Pakistan; “Middle East” includes Iran, the Arab Middle East, and North Africa. See Appendix 1 for a detailed explanation of the basis of this information and its limitations. The parenthetical Russian figures for 1989–91 appear to reflect the movement of about 1,660 SS-1 Scud ballistic missiles from the Soviet Union to Afghanistan after the formal withdrawal of Soviet ground forces from the Afghan War. Since Soviet missile troops appear to have operated these systems, these movements should not be considered transfers and have been excluded from the totals. For a Pakistani view of Soviet missile operations in Afghanistan, see Mohammad Yousaf and Mark Adkin, *Afghanistan—The Bear Trap: Defeat of a Superpower* (Havertown, PA: Casemate, 1992), p. 230.

While these interdiction reports do not represent a random sample of North Korea’s missile-related exports—foreign governments’ interest in intercepting shipments from North Korea has grown over time, and North Korea has adapted in response—certain patterns are nevertheless apparent. The peak period for shipment of parts and materials from North Korea, 1996–2000, coincides with the period of *least* activity in North Korean transfers of complete systems, as shown in Table 1. These five years were also the peak period for all North Korean missile-related interdictions, which declined sharply in the following decade. In this last period, seizures of other North Korean arms, such as tanks, air-defense systems, rocket-propelled grenades, and rocket-artillery systems, have risen sharply. This pattern suggests that the decline in missile-related activity is real and not simply a function of improved denial-and-deception techniques by North Korean arms exporters. Of the North Korean cargoes seized since 2009 under the authority of UN Security Council Resolutions 1718 and 1874, none are known to have included ballistic missiles, their components and materials, or missile-production equipment.<sup>2</sup>

**TABLE 2**

Known interdictions of North Korean shipments of arms or related materials, 1981–2010.

	1981–85	1986–90	1991–95	1996–2000	2001–05	2006–10
<b>Ballistic missile–related seizures</b>	0	0	1	7	1	2
<i>Complete missiles</i>	0	0	0	0	1	0
<i>Missile parts or materials</i>	0	0	0	6	0	1
<i>Complete assembly line</i>	0	0	0	1	0	0
<i>Manufacturing equipment</i>	0	0	1	0	0	1
<b>Seizures of other arms, parts, or materials</b>	0	1	0	3	1	6
<b>Total seizures</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>10</b>	<b>2</b>	<b>8</b>

Note: Data are through September 2010. See Appendix 2 for sources.

### Competing Explanations for the Declining Missile Trade

The advantages of theater ballistic missiles are well understood: they can carry warheads armed with conventional, chemical, biological, or nuclear payloads, and while inefficient compared to strike aircraft, which can be used many times, ballistic missiles boast range, speed, and relative ease of use. Until recently, they did not need to overmatch the enemy's corresponding defenses, since few signs of a reliable defense against theater ballistic missile attacks existed prior to 2003.<sup>3</sup> Many analysts have also pointed to the special value of ballistic missiles as symbols of power, prestige, and technological advancement.<sup>4</sup> Whether for the sake of deterrence, for status, or for both reasons, missile proliferation tends to be an established feature of regional military competitions.<sup>5</sup> Nevertheless, during the last decade and a half, global deliveries of ballistic missiles have been greatly outstripped by deliveries of other arms, including combat aircraft and air- and missile-defense systems.

Potential explanations for this shift fall into two broad categories: either supply has been choked off, or demand has waned. Both ideas are considered here, but demand-side explanations for the decline emerge as more persuasive.

Significant efforts to restrict supply include the promotion of export control norms under the Missile Technology Control Regime (MTCR), the Hague Code of Conduct, and related bilateral agreements. The effects of the MTCR (and the parallel commitments undertaken by China) include a reduction in the technical sophistication and range of ballistic-missile systems potentially available to developing states.<sup>6</sup> Short- and medium-range liquid-fueled missiles, which are relatively difficult to maintain and operate, remain widely available through North Korea's continued presence as a seller.<sup>7</sup> Indeed, in the fallow period after 1993, North Korea appears to have dominated what remains of the

market for complete ballistic missile systems, supplying almost two-thirds of the units delivered worldwide. Until 2009, no other state appears to have delivered complete ballistic missile systems to the Middle East, the source of nearly all post-Cold War demand.<sup>8</sup>

Major undertakings to strengthen global arms interdiction efforts include the Proliferation Security Initiative (PSI) and UN Security Council Resolutions 1540, 1718, 1747, 1874, and 1929. US officials have stated that the PSI has been responsible for a number of successful interdictions, including at least two shipments headed to North Korea.<sup>9</sup> Some believe that these efforts also have interfered significantly with North Korean ballistic missile exports; indeed, in May 2005, the Danish ambassador to the United States asserted that "the shipment of missiles has fallen significantly in the lifetime of PSI," a claim endorsed by the US State Department.<sup>10</sup> However, the available data show no meaningful change in the pattern of missile deliveries after the introduction of the PSI in 2003 (see Table 1).

Demand-reducing factors appear more important. One such factor is technological advancement among certain of North Korea's past customers. By selling not only the missile systems themselves, but also the technology to manufacture ballistic missiles, North Korea has helped a subset of missile buyers to become independent or semi-independent producers. This pathway seems to be preferred by states that lack reliable access to the world's most advanced weapons systems, but have sufficient technical and managerial capacities to acquire and assimilate the technologies and processes for ballistic missile production.<sup>11</sup> As an unnamed US official explained in 1996, "North Korea's missile trade is like a localized cancer that starts to spread. First you see the missile sales, but then it spreads to services and production technology and becomes harder and harder to track."<sup>12</sup> The clearest indications of this process of advancement occur when former missile importers start producing new types of missiles and seek to become exporters in their own right.

Within North Korea's historical customer base, Iran and Pakistan fall into this category of "more capable" buyers. Both countries may still find it necessary to acquire some components and materials abroad, but they can be said to have largely or entirely "graduated" from having to purchase complete systems and have even begun to produce their own types of missiles. The US intelligence community describes Iran as "mov[ing] toward self-sufficiency in the production of ballistic missiles," but "almost certainly" continuing to receive key components from North Korea and other foreign suppliers. The intelligence community also describes Iran as having marketed "at least one ballistic missile system" for export.<sup>13</sup> Despite Pakistan's frequent missile tests, publicly available data contain no indication of complete ballistic missile systems imported after 1996 (see Table 1). According to the intelligence community, Pakistan continues to receive assistance from Chinese "entities," possibly in connection with solid-fueled ballistic missiles acquired from China in the early 1990s. There is no mention of similar assistance from North Korea.<sup>14</sup> There is evidence that as early as 1999, Pakistan's Khan Research Laboratories marketed liquid-fueled ballistic missiles based on technology received from North Korea.<sup>15</sup>

States within a related category of “transitioning” missile buyers, including Syria and Egypt, appear to have become mainly buyers of components and materials rather than complete systems and may be progressing toward greater independence. The US intelligence community has reported that Syria, although dependent on foreign suppliers for some key missile technologies, is “developing” its own variants on the SS-1 “Scud” short-range ballistic missile “with assistance from North Korea and Iran.”<sup>16</sup> In a recent report, however, the intelligence community adds that Syria “has growing domestic capabilities and poses the risk of missile proliferation.”<sup>17</sup> Egypt has been subjected to far less public scrutiny, but an analysis of commercial imagery published in 2010 shows that its missile-development infrastructure underwent considerable expansion between 2001 and 2009.<sup>18</sup> Based on the limited information in the public sphere, it is difficult to assess the extent to which Egypt continues to depend on foreign suppliers such as North Korea for key missile technologies.

A second factor in declining missile sales is that market saturation has set in among the “less capable” subset of buyers. US allies in the Middle East that purchased ballistic missiles from North Korea, specifically the United Arab Emirates and Yemen, have not used them in battle and seem to have little expectation of doing so in the future. (The same observation applies to Saudi Arabia, which purchased ballistic missiles from China.) Whatever gains in domestic prestige, regional standing, or deterrence that the purchase of ballistic missiles brought about have already been realized through the acquisition of small ballistic missile arsenals, numbering in the double digits. The main reason for states in this group to buy new missiles, if they were to do so at all, would be to replace aging systems, not to expand their forces.

A perception of diminished military utility seems to contribute to these buyers’ declining interest. Compared with other potentially available weapons systems, ballistic missiles may simply be seen as “yesterday’s news.” Analyst Dennis Gormley has argued that the demonstration of the US Navy’s Tomahawk Land-Attack Missile during Operation Desert Storm triggered global interest in obtaining cruise missiles, which have become increasingly widespread in the intervening years.<sup>19</sup> Also, as security studies professor Aaron Karp has observed, the events of the first Gulf War did more to impress many Middle Eastern states with the desirability of missile defense systems than to convince them of a need for additional ballistic missiles.<sup>20</sup> A lag of two years at most between sales agreements and deliveries would match the timing of the war with the fall-off in ballistic missile transfers to the developing world after 1993.

Pressure from the United States on potential buyers acts as a third demand-reducing factor. For Arab allies of the United States, purchases of strategic technologies from a third party outside the US orbit can have a double purpose: they can offset pressure from neighboring states while simultaneously providing a means of demonstrating independence from their superpower patron. Yet there appear to be limits to the willingness of some states to continue injecting this irritant into their relations with Washington, especially if—as in the case of Saudi Arabia and the United Arab Emirates—they have the opportunity to acquire combat aircraft, air-launched cruise missiles, and missile defense systems from Western partners.

TABLE 3

Status of importers of ballistic missiles from North Korea.

Country	Imports of complete systems	From	Local production of imported types	Local production of new types	Marketing of complete systems	Summary assessment
Egypt	1970s–90s?	Soviet Union, North Korea	1990s	?	–	Transitioning
Iraq	1970s	Soviet Union, North Korea (attempted)	–	1980s (mod. of imported units)	–	(No current program)
Syria	1970s–late 2000s	Soviet Union, North Korea	1990s?	2000s	–	Transitioning
Libya	1970s–late 1990s	Soviet Union, North Korea	1990s?	–	–	Failed transition?
Yemen	1970s, early 2000s	Soviet Union, North Korea	–	–	–	Less capable
Iran	Mid-1980s–mid-2000s	Libya, Syria, China, North Korea	1990s	2000s	Ca. 2010	More capable
UAE	Late 1980s, late 1990s	North Korea	–	–	–	Less capable
Pakistan	1990s	China, North Korea	Late 1990s	2000s	Late 1990s?	More capable

Notes: Egypt and Pakistan attempted local development of missiles with foreign assistance before importing complete systems. Iraq attempted to purchase missile systems from North Korea in the early 2000s and possibly earlier. Sources: Nuclear Threat Initiative Research Library Country Profiles, <www.nti.org>; Martin S. Navias, *Going Ballistic: The Build-up of Missiles in the Middle East* (London: Brassey's, 1993); Wisconsin Project on Nuclear Arms Control, "Egypt's Missile Efforts Succeed with Help from North Korea," *Risk Report 2* (September–October 1996); Wisconsin Project on Nuclear Arms Control, "North Korean Missile Exports"; Mark Fitzpatrick, ed., *Nuclear Black Markets: Pakistan, A.Q. Khan and the Rise of Proliferation Networks* (London: International Institute for Strategic Studies, 2007); Daniel A. Pinkston, *The North Korean Ballistic Missile Program* (Carlisle, PA: Strategic Studies Institute, 2008); Joseph S. Bermudez Jr., "Pyramid Scheme: Egypt's Ballistic Missile Test and Launch Facility," *Jane's Intelligence Review*, February 9, 2010; Office of the Director of National Intelligence, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 January to 31 December 2010," 2011.

The three types of states—"more capable," "transitioning," and "less capable,"—are outlined in Table 3, which lists developing states that have purchased (or, in the case of Iraq, attempted to purchase) complete missile systems from North Korea.

### Demand for Ballistic Missiles in the Middle East

As noted above, the demand for complete ballistic missiles since the mid-1980s has occurred almost exclusively in the Middle East. With a few exceptions, states in other

regions that have pursued ballistic missiles during the same period have emphasized the advancement of their own research and development programs over the rapid acquisition of operational missile forces; Karp has remarked on the “gradual and deliberate” pace of most missile programs in recent decades.<sup>21</sup> Middle Eastern states that have shifted into the “more capable” category effectively have converged with this more typical developmental path.

What explains the region’s hastier path to missiles, which has provided the main basis of North Korea’s missile market, and that of the market for complete missiles in general? While the Soviet Union set the stage for later developments by supplying Middle Eastern client states with Scud missiles as early as the 1970s, the region’s defining experience with these weapons came during the 1980s. Over most of the course of the Iran-Iraq War, which was largely stalemated on the ground, the two combatant states carried out air and missile campaigns against each other’s urban centers. Iraq initiated the process in 1982, attacking Iranian cities with Soviet-supplied Scuds. Iran, facing difficulty keeping its US-made air force operational, acquired Soviet Scuds second-hand by way of Libya and Syria and began firing them at Iraqi cities in 1985. Seeking further missile supplies, Iran then turned to North Korea. The “wars of the cities” continued, on and off, until the August 1988 armistice; in just the last eight months of the conflict, each side conducted hundreds of missile strikes.<sup>22</sup>

Iran’s missile use against Iraq, starting in 1985, triggered the best-documented instance of missile proliferation in the Middle East: Saudi Arabia’s purchase of intermediate-range ballistic missiles from China. After the United States refused to sell short-range Lance missiles to Saudi Arabia, the Saudis turned to other sources for a capability to match Iran’s.<sup>23</sup> Khaled bin Sultan, commander of the Saudi missile forces, explained years later that this search had been motivated by concerns that Iran might undertake “a campaign of military and economic attrition” against Saudi Arabia:

It was against this background of Iranian violence and persistent belligerence that, I assume, King Fahd decided that we needed a weapon to improve the morale of our armed services and our people; a deterrence weapon not intended to be used, except as a last resort when it should be able to demoralize the enemy by delivering a painful and decisive blow; a weapon which, once launched, could not be jammed or intercepted; a weapon which would make an enemy think twice before attacking us. The challenge was to find a country able to supply such a weapon at speed and without constraining conditions. The King’s choice fell on China.<sup>24</sup>

In early 1988, US intelligence services detected Chinese CSS-2 intermediate-range ballistic missiles in Saudi Arabia, triggering an angry dispute that led to the recall of the US ambassador.<sup>25</sup> King Fahd took the occasion to assert the independence of Saudi defense policy, declaring, “The Kingdom of Saudi Arabia is not tied to anyone and does not take part in any pact that forces upon it any sort of obligations.”<sup>26</sup>

A similar mixture of fears about regional security and desires to assert national independence and stature appears to have driven Iran, Syria, Libya, and the United Arab Emirates to purchase Scud missiles from North Korea in the late 1980s and early 1990s.<sup>27</sup>



Egypt allegedly purchased missile components from North Korea around this time as well.<sup>28</sup>

The end of the ballistic missile boom coincided roughly with the next major instance of missile use. In January 1991, during the first Gulf War, Iraq fired ballistic missiles at targets in Israel, Saudi Arabia, Bahrain, and Qatar, but the attacks did nothing to prevent Iraq's defeat. Saudi Arabia's newly operational missile force, having failed to deter the Iraqi strikes, also seemed to have lost its luster, especially in comparison to the weapons used to dramatic effect by Western members of the coalition: manned air power, cruise missiles, and missile defenses.<sup>29</sup>

Within the confines of the publicly available data, the acquisition, restocking, and expansion of Middle Eastern ballistic missile arsenals during the Iran-Iraq War and through the first Gulf War (i.e., 1987–93, allowing two years for the lag between contracts and deliveries) explain upward of 80 percent of North Korea's recorded deliveries. No deliveries of complete systems from North Korea to the region are recorded for the next five years (1994–98).

This absence suggests that existing missile stockpiles sufficed for the buyers on the "less capable" end of the spectrum. "Transitioning" states, some of which today fall in the "more capable" category, appear to be responsible for rising numbers of shipments of North Korean components during the same period in the mid- to late 1990s, when attempted deliveries to Egypt, Libya, Syria, and Pakistan were intercepted. These observations do not mean that zero transfers of complete systems occurred in the Middle East, since some deliveries might have evaded detection.<sup>30</sup> Pakistan is known to have acquired medium-range ballistic missiles and production technology from North Korea in the mid-1990s, mirroring a similar transaction between North Korea and Iran in the early 1990s.<sup>31</sup> Overall, however, the fall-off in recorded deliveries of complete systems and the rise in the interception of components and materials occurred simultaneously, and not coincidentally.

In the late 1990s and early 2000s, a small-scale resumption of the ballistic missile race in the Middle East took place, driven by two factors. The first factor was the renewed use of the weapons in the region. Missile launches during Yemen's 1994 civil war may have generated some concern, but probably not to the same extent as Iran's renewed missile attacks against targets in Iraq, repeatedly striking encampments of an exiled Iranian opposition group between 1994 and 2001.<sup>32</sup> Unable to respond in kind to Iran's strikes, Iraq set out to restore its own ballistic-missile arsenal, notwithstanding UN sanctions. From 1999 to 2002, working through Iraq's embassy in Damascus, Iraqi officials negotiated with their North Korean counterparts for access to ballistic missile technology and other arms. Through Syrian intermediaries, the Iraqis also sought to purchase advanced SS-26 ("Iskander" or "Stone") short-range ballistic missiles and other types of military equipment from Russia. None of these efforts were successful.<sup>33</sup>

The second factor was a desire to replace older weapons. Saudi Arabia's plan to replace its aging CSS-2 missiles was revealed in March 1997 by the chief of staff of the Royal Saudi Armed Forces, Lieutenant General Saleh Mohaya, in an interview with the trade publication *Defense News*. The same article described visits by Khaled bin Sultan to China and Russia and reported US concerns about the start of a new regional arms race.<sup>34</sup> These fears appear to have been justified, as deliveries of North Korean Scud missiles to

the Middle East resumed in 1999, though on a smaller scale than in the late 1980s and early 1990s. According to one published source, the buyers were Saudi Arabia's neighbors, the United Arab Emirates and Yemen.<sup>35</sup>

It is unclear whether the Saudi shopping expeditions were motivated more by Iran's missile strikes against Iraq, by intelligence reports of Iraq's attempts to rearm, or by a general desire to maintain a viable missile force. Regardless, the publicity seems to have spurred the Kingdom's neighbors to renew their own small missile forces. A shipment of fifteen Scud missiles from North Korea to Yemen received extensive publicity in early December 2002, when the Spanish Navy briefly detained the North Korean cargo vessel *So San* in the Gulf of Aden. According to Yemen's foreign minister, Abu-Bakr al-Qirbi, Yemen had bought its North Korean Scuds "two or three" years before the interrupted delivery, viewed them as similar to what other countries in the region already possessed, and had no intention of buying more.<sup>36</sup> The delivery had not been the first, but the Yemenis assured Washington that it would be the last.<sup>37</sup>

Since then, North Korea has only occasionally delivered missiles to its remaining customers in the Middle East. These states appear to be Iran and Syria, which seek strategic weapons to offset the military capabilities of the United States and Israel. Iran's arsenal, described as the largest in the Middle East, is estimated at about 1,000 ballistic missiles; Syria's arsenal is described as one of the largest in the region.<sup>38</sup> The scale of ballistic missile deployments in Iran and Syria may be related to the appearance of US- and Israeli-made defensive systems in the region, which put pressure on adversaries to deploy larger and more sophisticated missile arsenals.<sup>39</sup> Large numbers of missiles facilitate salvo-firing tactics designed to overwhelm defenses.<sup>40</sup>

Judging by the small numbers of complete missiles transferred from North Korea to the Middle East in recent years, both Iran and Syria appear to have imported samples of new missile types from North Korea before attempting local assembly or production. Although North Korea is not the only source of foreign expertise for either country, it appears to maintain collaborative relationships with both states in missile development. One hint of joint development appeared in a televised parade in October 2010, when North Korea exhibited medium-range ballistic missiles with a type of nosecone seemingly identical to those previously seen on similar missiles in Iran.<sup>41</sup>

Pyongyang has also become an important supplier of other weapons for Iran and Syria. Multiple shipments of North Korean artillery rockets, rocket-propelled grenades, and surface-to-air missiles to Iran, all seized in 2009, may be related to the restocking of Hezbollah and Hamas arsenals after the conflicts of 2006 and 2008–09. Shipments of a variety of arms or related equipment from North Korea to Syria have been seized in recent years, including mobile air-defense systems (2006), nuclear-biological-chemical protective suits (2009), and "metal and pipes" allegedly suitable for building rocket artillery launchers (2010).<sup>42</sup> North Korea's nuclear trade in recent years also seems to operate within similar channels. In 2008, the US intelligence community described the construction of a carefully hidden plutonium production reactor in Syria, a project that began in 1997 with North Korean assistance and was disrupted by an Israeli air strike in 2007.<sup>43</sup>

### Implications for the Nuclear Black Market

Two broad insights can be drawn from the shifting patterns of North Korea's military commerce. The first such observation relates to the buyers. In recent decades, affairs in the post-Cold War Middle East seem to have operated in two modes: an anarchic mode, in which all states mistrust and arm against one another; and a polarized mode, with two camps divided by ideology, geopolitical alignments, and weapons technology. The region appears capable of exhibiting both dynamics at once. The large-scale missile racing of the late 1980s and early 1990s and its echo in the late 1990s and early 2000s belong to the anarchic mode; the ongoing offense-defense race belongs to the polarized mode. Nevertheless, the first Gulf War marked a shift from mostly anarchy to mostly polarization. The direct intervention of US-led Western powers against Iraq, the demonstration of their cutting-edge military technologies, and the subsequent expansion of their arms sales in the region all meant that Middle Eastern states had a choice: they could either align more closely with the West to take advantage of the latest high-technology arms, or they could find ways to counteract them.

The second observation relates to North Korea. Pyongyang has proven adaptable to shifting market and security environments. During periods of many-sided missile racing, North Korea has acted as a no-strings-attached exporter of weapons and technology, willing to transfer arms, production equipment, components and materials to seemingly any buyer. During the overlapping period of offensive-defensive arms racing, it has engaged in a more exclusive pattern of collaborative missile development among a handful of revolutionary states, whose regional adversaries may include some of North Korea's own past customers.

This shift can also be explained in terms of Pyongyang's twin goals: accumulating foreign currency and strengthening its own defenses. As long as there is an opportunity to advance at least one of these aims, North Korea will have an incentive to work with other countries in sensitive areas. In the field of missiles, security seems increasingly to outweigh purely economic concerns. The first Gulf War may have left as strong an impression in Pyongyang as it did in Tehran and Damascus: the Western coalition dominated Iraq's manned air power and swiftly rolled up its ground forces but never succeeded in suppressing its missile forces.<sup>44</sup> Still, any impression of success in Iraqi missile operations must come to terms with their lack of actual military utility. Imprecise strikes, as well as the prospect of vulnerability to missile defenses, reveal the need for extensive upgrades. Under these circumstances, pooling resources with other countries in a similar position is a reasonable choice.

The Middle East's shifting security environment and North Korea's adaptability have implications beyond the missile trade. Of the countries worldwide that have recently expressed interest in entering the field of nuclear power production, about half are in the Middle East.<sup>45</sup> Sparked by developments in Iran (which has begun enriching uranium and has commenced operations at the region's first nuclear power plant) and seemingly sustained by mutual rivalry, Arab states' plans for nuclear power resemble earlier, anarchic patterns of missile acquisition.<sup>46</sup> And as with missiles, buyers will not find many willing suppliers of sensitive technology among the major industrial states.

North Korea's willingness to transfer nuclear materials and technology to Pakistan and Syria suggests that it might be willing to sell fuel cycle technologies to a broad range of Middle Eastern customers, to collaborate with a select partner such as Iran, or to do both at once.<sup>47</sup> Pyongyang's pattern of missile-related transactions offers precedents for either type of arrangement.

Whether North Korea's leaders would find nuclear dealings to be helpful from a security perspective is questionable. After two nuclear tests and the disclosure of its uranium enrichment program, North Korea appears to be ahead of both Iran and Syria in nuclear technology, which would give it little to gain from a joint-development approach. Pyongyang's never-ending financial needs, combined with Middle Eastern states' desire to compete with Iran in the nuclear field, suggest considerable potential for North Korean sales of uranium conversion and enrichment equipment, along with uranium supplies.

## DISCLAIMER

The views expressed in the above article are the author's and should not be attributed to his employer or clients.

## NOTES

1. "It is the consistent principle maintained by the DPRK [Democratic People's Republic of Korea] government in national defence that as long as it remains subjected to military threat from outside, it should produce by itself and deploy military equipment to safeguard the security of the country and the people. On this principle, we will continue developing, testing and deploying missiles. With missiles of the United States, which is at war with the DPRK technically, aiming at our territory, we find no reason to refrain from developing and deploying missiles to counter them. . . . Our missile export is aimed at obtaining foreign money we need at present. As the United States has pursued economic isolation of the DPRK for more than half a century, our resources of foreign money have been circumscribed. So, missile export is the option we could not but take." Korean Central News Agency, "Nobody Can Slander DPRK's Missile Policy: KCNA Commentary," June 16, 1998, <[www1.koreanp.co.jp/pk/047th\\_issue/98061708.htm](http://www1.koreanp.co.jp/pk/047th_issue/98061708.htm)> .
2. UN Security Council, "Letter Dated 14 January 2010 from the Chairman of the Security Council Committee Established Pursuant to Resolution 1718 (2006) Addressed to the President of the Security Council," S/2010/28, January 18, 2010. Four cases were reported by UN member states on August 14, October 12, December 23, and December 28, 2009. For the details of these cases, see UN Security Council, "Note by the President of the Security Council," S/2010/571, November 5, 2010, pp. 25–26. Three new cases were reported in 2010, but as of this writing, it is unclear whether they concern attempted arms exports. See UN Security Council, "Letter Dated 18 February 2011 from the Chairman of the Security Council Committee Established Pursuant to Resolution 1718 (2006) Addressed to the President of the Security Council," S/2011/84, February 22, 2011, pp. 5–6.
3. Thomas L. McNaugher, "Ballistic Missiles and Chemical Weapons: The Legacy of the Iran-Iraq War," *International Security* 15 (Fall 1990), pp. 5–34; Steve Fetter, "Ballistic Missiles and Weapons of Mass Destruction: What Is the Threat? What Should Be Done?" *International Security* 16 (Summer 1991), pp. 5–41; and W. Seth Carus, *Ballistic Missiles in Modern Military Conflict* (New York: Praeger, 1991), pp. 27–30. For most observers, the first clear-cut success of defenses against theater ballistic missiles took place in the opening phases of Operation Iraqi Freedom in 2003. However, Middle Eastern militaries appear to have viewed defensive systems as worthwhile during Operation Desert Storm in 1991, based on their subsequent willingness to purchase Patriot theater ballistic missile defense systems. On this

- point, see Khaled bin Sultan with Patrick Seale, *Desert Warrior: A Personal View of the Gulf War by the Joint Forces Commander* (New York: HarperCollins, 1995), pp. 351–52.
4. For versions of this idea, see, Fetter, “Ballistic Missiles and Weapons of Mass Destruction,” p. 11; and John Barker, Michael Elleman, John Harvey, and Uzi Rubin, *Assessing Ballistic Missile Proliferation and Its Control* (Stanford: Center of International Security and Arms Control, 1991), pp. 80–81.
  5. Janne E. Nolan, *Trappings of Power: Ballistic Missiles in the Third World* (Washington, DC: Brookings Institution, 1991), pp. 74–95; and Dennis M. Gormley, *Missile Contagion: Cruise Missile Proliferation and the Threat to International Security* (London: Praeger Security International, 2008), pp. 28–46.
  6. For a detailed examination of the MTCR, see Dinshaw Mistry, *Containing Missile Proliferation: Strategic Technology, Security Regimes, and International Cooperation in Arms Control* (Seattle: University of Washington Press, 2003). Dennis Gormley’s argument that the MTCR has made cruise missile acquisition more promising than ballistic missile acquisition applies more clearly to countries attempting local production than to buyers of complete exported systems. Dennis M. Gormley, “Winning on Ballistic Missiles but Losing on Cruise: The Missile Proliferation Battle,” *Arms Control Today* 39 (December 2009), pp. 22–29.
  7. So far, there are no news reports of buyers for North Korea’s KN-02 solid-fueled short-range missiles.
  8. There is some reason to believe that Saudi Arabia has sought to replace its existing Chinese-made ballistic missile force, potentially buying from China; however, as shown in Table 1, China does not appear to have exported missiles since 1992. This omission may reflect the limits of publicly available US government data. Anthony H. Cordesman, *Saudi Arabia Enters the Twenty-First Century: The Military and International Security Dimensions* (London: Praeger, 2003), pp. 327–28.
  9. Mark J. Valencia, “The Proliferation Security Initiative: A Glass Half-Full,” *Arms Control Today*, June 2007, <[www.armscontrol.org/act/2007\\_06/Valencia](http://www.armscontrol.org/act/2007_06/Valencia)>.
  10. Wade Boese, “Key U.S. Interdiction Initiative Claim Misrepresented,” *Arms Control Today*, July/August 2005, <[www.armscontrol.org/print/1848](http://www.armscontrol.org/print/1848)>; State Department, Daily Press Briefing, May 31, 2005.
  11. Geoffrey Forden, “How the World’s Most Underdeveloped Nations Get the World’s Most Dangerous Weapons,” *Technology and Culture* 48 (January 2007), pp. 92–103. For those “less capable” states determined to acquire ballistic missiles, the possibilities may include importation of complete systems, failed assimilation of complex technologies, or a lengthy course of capacity-building as a preliminary to technology transfer.
  12. Wisconsin Project on Nuclear Arms Control, “North Korean Missile Exports,” *Risk Report 2* (November–December 1996).
  13. Office of the Director of National Intelligence, “Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 January to 31 December 2010” (hereafter the “721 Report for 2010”), 2011, p. 4.
  14. *Ibid.*, p. 7.
  15. Mark Fitzpatrick, ed., *Nuclear Black Markets: Pakistan, A.Q. Khan and the Rise of Proliferation Networks* (London: International Institute for Strategic Studies, 2007), p. 83.
  16. Office of the Director of National Intelligence, “Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 January to 31 December 2009” (hereafter the “721 Report for 2009”), 2010, p. 7.
  17. Office of the Director of National Intelligence, “721 Report for 2010,” p. 6.
  18. Joseph S. Bermudez Jr., “Pyramid Scheme: Egypt’s Ballistic Missile Test and Launch Facility,” *Jane’s Intelligence Review*, February 9, 2010.
  19. Gormley, *Missile Contagion*, pp. 47–82.
  20. Aaron Karp, “The Middle East in Strategic Transition: From Offense to Defense Dominance?,” in *Missile Proliferation and Defences: Problems and Prospects* (Monterey, CA: Center for Nonproliferation Studies, 2001), pp. 77–87.
  21. Aaron Karp, *Ballistic Missile Proliferation: The Politics and Technics* (New York: Oxford University Press, 1996), p. 15.
  22. Anthony H. Cordesman and Abraham R. Wagner, *The Lessons of Modern War, Vol. II: The Iran-Iraq War* (San Francisco: Westview Press, 1990), pp. 495–502.
  23. Martin S. Navias, *Going Ballistic: The Build-up of Missiles in the Middle East* (London: Brassey’s, 1993), pp. 56–59.
  24. Sultan with Seale, *Desert Warrior*, p. 145.

25. Josh Pollack, "Saudi Arabia and the United States, 1931–2002," *Middle East Review of International Affairs* 6 (September 2002), pp. 82–83.
26. Youssef M. Ibrahim, "Saudis Reaffirm a Right to Vary Arms Dealings," *New York Times*, July 28, 1988, <[www.nytimes.com/1988/07/28/world/saudis-reaffirm-a-right-to-vary-arms-dealings.html](http://www.nytimes.com/1988/07/28/world/saudis-reaffirm-a-right-to-vary-arms-dealings.html)>.
27. Peter Hayes, "The Two Koreas and the International Missile Trade," in William C. Potter and Harlan W. Jencks, eds., *The International Missile Bazaar: The New Suppliers' Network* (Boulder, CO: Westview Press, 1994), pp. 148–51; Navias, *Going Ballistic*, pp. 43–61.
28. Joseph S. Bermudez Jr., "A History of Ballistic Missile Development in the DPRK," Center for Nonproliferation Studies, Occasional Paper No. 2, 1999, pp. 12, 19.
29. Khaled bin Sultan later explained: "If ever there was a right moment to unleash our Chinese-built surface-to-surface missiles, this seemed to be it. We felt we needed to hit back in self-defense to as to deter further Iraqi Scud attacks. . . . But, after some anxious hours, King Fahd decided not to escalate the conflict. . . . He did not want to cause casualties among innocent Iraqi civilians and he no doubt judged that the Coalition's air campaign being waged against Iraq was sufficient retaliation." Sultan with Seale, *Desert Warrior*, p. 350.
30. While meeting with visiting reporters from South Korea in August 2000, North Korean leader Kim Jong Il mentioned that his country "has been selling rockets to Surinam [i.e., Syria] and Iran." See "Kim Jong-il's Dialogue with South Korean Media Heads," *Chosun Ilbo* (English edition), August 13, 2000, as reprinted by Federation of American Scientists, <[www.fas.org/news/dprk/2000/200008130358.htm](http://www.fas.org/news/dprk/2000/200008130358.htm)>.
31. Bermudez, "A History of Ballistic Missile Development in the DPRK," pp. 23–25.
32. Joseph S. Bermudez Jr., "KPA Lessons Learned from Foreign Conflicts, 1960–Present, Part I," *KPA Journal* 1 (September 2010), p. 4; and Amin Tarzi and Darby Parliament, "Missile Messages: Iran Strikes MKO Bases in Iraq," *Nonproliferation Review* 8 (Summer 2001), pp. 125–33.
33. David E. Sanger and Thom Shanker, "For the Iraqis, a Missile Deal That Went Sour," *New York Times*, December 1, 2003, <[query.nytimes.com/gst/fullpage.html?res=9902E2D8103AF932A35751C1A9659C8B63](http://query.nytimes.com/gst/fullpage.html?res=9902E2D8103AF932A35751C1A9659C8B63)>; and Charles Duelfer, "Comprehensive Report of the Special Advisor to the Director of Central Intelligence on Iraq's Weapons of Mass Destruction," Central Intelligence Agency, September 30, 2004, pp. 119–21, 273–80.
34. Philip Finnegan, "Saudis Study Missile Buy To Replace Aging Arsenal: US Fears Move May Spur Arms Race in Middle East," *Defense News*, March 17–23, 1997.
35. Gary Samore, ed., *North Korea's Weapons Programmes: A Net Assessment* (London: International Institute for Strategic Studies, 2004), p. 82.
36. Khalil Fulayhan, "Interview with Yemeni Foreign Minister Abu-Bakr al-Qirbi," *An-Nahar* (Lebanon), December 21, 2002.
37. The United States imposed sanctions on North Korea's Changgwang Sinyong Corporation in mid-August 2002 in response to missile exports to Yemen. See "Chronology of U.S.-North Korean Nuclear and Missile Diplomacy," Arms Control Association, factsheet, <[www.armscontrol.org/factsheets/dprkchron](http://www.armscontrol.org/factsheets/dprkchron)>. A spokesman for the Yemeni Embassy told a reporter that a single previous shipment had taken place. See Bill Gertz, "N. Korea Ships Fuel, Missiles to Yemen," *Washington Times*, December 2, 2002. Secretary of State Colin Powell told reporters that Yemeni President Abdullah Saleh had described the shipment as "the last of a group" and gave assurances that they would not be retransferred to any third party. See State Department, "Powell Explains Decision to Allow Missile Delivery to Yemen," *Washington File*, December 11, 2002.
38. Office of the Director of National Intelligence, "721 Report for 2010," p. 8; Dennis C. Blair, "Annual Threat Assessment of the US Intelligence Community," Statement for the Record for the Senate Select Committee on Intelligence, February 2, 2010, p. 13; and Department of Defense, "Unclassified Report on Military Power of Iran," April 2010, p. 11.
39. On this point, see Karp, "The Middle East in Strategic Transition," p. 85.
40. Department of Defense, "Ballistic Missile Defense Review Report," February 2010, pp. 7–8.
41. Joshua Pollack, "Another North Korean Missile First," *ArmsControlWonk.com*, October 10, 2010, <[pollack.armscontrolwonk.com/archive/3388/another-north-korean-missile-first](http://pollack.armscontrolwonk.com/archive/3388/another-north-korean-missile-first)>.
42. See Appendix 2, Table 4 for sources.
43. Office of the Director of National Intelligence, "Background Briefing with Senior US Officials on Syria's Covert Nuclear Reactor and North Korea's Involvement," April 24, 2008.

44. Joseph S. Bermudez Jr., "KPA Lessons Learned from Foreign Conflicts, 1960–Present, Part II," *KPA Journal* 1 (October 2010), pp. 2–3.
45. Counting Iran, Turkey, Israel, and Arab states, fifteen of the twenty-eight countries listed in a recent study of states with ambitions to launch nuclear power programs are located in the Middle East. See Sharon Squassoni, *Nuclear Energy: Rebirth or Resuscitation?* (Washington, DC: Carnegie Endowment for International Peace, 2009), pp. 48–56.
46. For an overview, see Mark Fitzpatrick, ed., *Nuclear Programmes in the Middle East: In the Shadow of Iran* (London: International Institute for Strategic Studies, 2008), pp. 35–60.
47. Joshua Pollack, "North Korea's Nuclear Exports: On What Terms?," 38North.org, Special Report No. 9, October 13, 2010.

## Appendix 1: Information on Ballistic Missile Transfers

Each year, the Congressional Research Service (CRS) publishes "Conventional Arms Transfers to Developing Nations," a report by analyst Richard Grimmett that covers arms transfers over the previous eight years and is based on "official, unclassified, background data from US government sources."<sup>1</sup> Since 1991, the reports have included a "surface-to-surface missile" category that has had a consistent definition from 1992 through the present. The reports, from 1992 through 2010 collectively, provide data on deliveries of these systems for 1984–2009.

The data are imprecise. Numbers of systems delivered by foreign suppliers are, in most cases, rounded to the nearest ten units and appear in bins covering four-year periods. By carefully comparing previous and subsequent reports, it is possible to identify the specific year of delivery in most cases.

Some inconsistencies across the reports hint at retrospective revisions to the underlying database. For this reason, data from the most recent years should be considered provisional. Even in the best case, it cannot be assumed that the information is perfectly complete; missile transactions in the developing world tend to be undertaken in secret. According to Grimmett, "Data relating to surface-to-surface and anti-ship missiles by foreign suppliers are estimates based on a variety of sources having a wide range of accuracy. As such, individual data entries in these two weapons delivery categories are not necessarily definitive."<sup>2</sup>

The CRS reports split arms sellers into six geography-based categories: the United States, Russia, China, Major West European, All Other European, and All Others. Surface-to-surface missile deliveries are recorded only for Russia, China, and All Others. North Korea appears to be the only exporter of surface-to-surface missiles in the "All Others" category from 1987 to the present. To avoid conflating North Korea's activities with those of other countries, the data for 1984 through 1986 have been excluded from Table 1.

## Appendix 2: Seizures of Arms and Arms-Related Equipment Attributed to North Korea

Table 4 summarizes public accounts of the inspection and seizure of arms or arms-related equipment either attributed to North Korea (i.e., headed from North Korea to another state, the importer), or headed from an intermediary state to the importer, but with reason to

<sup>1</sup> Richard F. Grimmett, "Conventional Arms Transfers to Developing Nations, 2002–2009," Congressional Research Service, September 10, 2010, p. 1.

<sup>2</sup> *Ibid.*, p. 63.

ascribe responsibility for the shipment to the North Korean government. One instance recorded here reflects the arrest of a group of businessmen described as involved in the export of production equipment. The data in Table 4 provide the basis for Table 2.

Table 4 is meant to provide insight into the shifting patterns of North Korean exports. For this reason, it does not include shipments headed to North Korea. It also omits reports of *suspected* arms shipments that were never inspected or seized, and are considered less reliable for that reason.

The table is almost certainly incomplete. It cannot be assumed that all incidents of interest have been reported. Other incidents of interest may have been reported but overlooked in the compilation of the table.



TABLE 4

Reports of seizures of arms or arms-related equipment attributed to North Korea.

Date	Place	Items inspected or seized	Apparent destination	Sources
Sep. 28, 2010	Port of Piraeus, Greece	"[M]etal and pipes that could be used in the construction of missile launchers," apparently meaning rocket artillery launchers	Syria	AP (9/28/10); <i>Kathimerini</i> (9/29/10)
Dec. 11, 2009	Don Muang Airport, Bangkok, Thailand	Conventional weapons (artillery rockets, rocket-propelled grenades, fuses)	Iran	NYT (12/13/09); Bloomberg (12/17/09); <i>LAT</i> (2/5/10)
November 2009	Port of Durban, South Africa	Two containers of parts and equipment for T-54/T-55 tanks, aboard <i>Westerhever</i>	Republic of the Congo	AP (2/25/10); <i>WSJ</i> (2/26/10)
Sep. 22, 2009	Port of Busan, South Korea	Four containers holding nuclear-biological-chemical protective suits, aboard <i>MSC Rachele</i>	Syria	<i>Dong-a Ilbo</i> (10/6 & 7/09); Bloomberg (2/12/10)
July 2009	Port of Khorfakkan, Sharjah, United Arab Emirates	Ten containers of conventional weapons (detonators, circuitry, surface-to-air missiles, and solid fuel for artillery rockets, rocket-propelled grenades), aboard <i>ANL Australia</i>	Iran	<i>FT</i> (8/28/09); <i>WP</i> (12/3/09); <i>Chosun Ilbo</i> (12/4/09)
June 29, 2009	Yokohama, Japan	Three arrested "over an attempt to illegally export to Myanmar a magnetic measuring device believed necessary for developing long-range ballistic missile systems on instructions from North Korea"	Myanmar (Burma)	<i>Daily Yomiuri</i> (6/30/09)
Sep. 5, 2006	Limassol Port, Cyprus	21 ground vehicles: 18 outfitted with air defense radars, 3 with command-and-control systems, aboard <i>Gregorio I</i>	Syria	AP (9/11/06)
2006–09	Unknown	Propellant for Scud-type missiles	Middle Eastern country	Foley remarks (6/22/09); UN report (5/2011)
August 2003	Kaohsiung Harbor, Taiwan	2,200 tons of aluminum powder (solid rocket fuel component), aboard <i>Be Gaehung</i> , openly offloaded in Taiwan (A shipment of dual-use chemicals intended for North Korea was also seized.)	Unknown	Central News Agency (8/10/03); <i>CSM</i> (8/12/03); <i>WP</i> (8/15/03)
Dec. 10, 2002	Gulf of Aden	15 Scud missiles and warheads, plus 85 drums of chemicals, aboard <i>So San</i>	Yemen	AP (12/10/02); <i>WT</i> (12/12/02)
April 2000	Zurich Airport, Switzerland	Scud missile parts carried in Taiwanese businessman's luggage	Libya	AP (4/12/00)
Nov. 24, 1999	Gatwick Airport, London, United Kingdom	32 crates of ballistic missile parts	Libya	<i>The Times</i> (1/10/00); <i>WP</i> (8/15/03)
June 1999	Kandla Port, India	Components, materials, machine tools, and documents for Scud-B and Scud-C production, aboard <i>Ku Wol San</i>	Libya	<i>The Hindu</i> (7/4/99); <i>WP</i> (8/15/03)

1997	Gatwick Airport, London, United Kingdom	Shipment of maraging steel (for rocket motor casings or gas centrifuge rotors)	Pakistan	<i>Sunday Telegraph</i> (11/1/98)
April 1997	Hong Kong	700 crates of artillery pieces	Syria	AFP (4/10/97)
Late 1996	Zurich Airport, Switzerland	Two incidents: Artillery rockets; days later, Scud-B missile components	Egypt	AFP (4/7/98)
Sep. 12, 1996	Kwai Chung Container Terminal, Hong Kong	Parts for artillery pieces, aboard <i>Chomyong Ho</i>	Syria	Yonhap (9/16/96); <i>SCMP</i> (9/17 & 21/96)
April 29, 1996	Hong Kong	200 containers of ammonium perchlorate (rocket fuel oxidizer), aboard <i>Qinghe</i>	Pakistan	<i>SCMP</i> (9/18/96)
March 12, 1996	Kaohsiung Harbor, Taiwan	200 containers of ammonium perchlorate (rocket fuel oxidizer), aboard <i>Chon Sung</i>	Pakistan	DPA (3/11/96)
Late 1992	Port of Augusta, Sicily, Italy	German-made machine parts useful for missile production, aboard <i>MS Waalhaven</i>	Syria	BBC (1/19/93)
April 10, 1987	Oostende Airport, Belgium	Anti-tank missiles	Angola	IPS (4/14/87)

AFP = Agence-France Presse; AP = Associated Press; BBC = British Broadcasting Corporation; *CSM* = *Christian Science Monitor*; DPA = Deutsche Presse-Agentur; *FT* = *Financial Times*; IPS = Inter Press Service; *LAT* = *Los Angeles Times*; *NYT* = *New York Times*; *SCMP* = *South China Morning Post*; *WP* = *Washington Post*; *WSJ* = *Wall Street Journal*; *WT* = *Washington Times*

Sources: "Ship Checked for Weapons," *Kathimerini English Edition*, September 29, 2010, <[www.ekathimerini.com/4dcgi/\\_w\\_articles\\_politics\\_2\\_29/09/2010\\_120076](http://www.ekathimerini.com/4dcgi/_w_articles_politics_2_29/09/2010_120076)>; Elena Becatoros, "Greece Checks NKorea Cargo, in Arms Probe," AP, September 28, 2010; Joe Lauria, Gordon Fairclough, and Peter Wonacott, "Pretoria Seized North Korean Weapons," *Wall Street Journal*, February 26, 2010; Edith M. Lederer, "South Africa Reports Seizing NKorea Tank Parts Being Exported in Violation of Sanctions," AP, February 25, 2010; Bill Varner, "North Korean Shipment of Chemical-Safety Suits Probed by UN," Bloomberg News, February 12, 2010; Mark Magnier, "Seized North Korea Arms Cache Still a Mystery," *Los Angeles Times*, February 5, 2010; Daniel Ten Kate, "Thailand Finds No Taepodong Missile Parts in N. Korean Plane," Bloomberg News, December 17, 2009; Thomas Fuller and David E. Sanger, "Thais Seize Plane Carrying Weapons From North Korea," *New York Times*, December 13, 2009; "Iran 'Bought Masses of N. Korean Arms,'" *Chosun Ilbo*, December 4, 2009, <[english.chosun.com/site/data/html\\_dir/2009/12/04/2009120400315.html](http://english.chosun.com/site/data/html_dir/2009/12/04/2009120400315.html)>; Joby Warrick, "Arms Smuggling Heightens Iran Fears," *Washington Post*, December 3, 2009; "Seized NK Containers Were Headed for Syria," *Dong-a Ilbo*, October 7, 2009, <[english.donga.com/srv/service.php3?biid=2009100756908](http://english.donga.com/srv/service.php3?biid=2009100756908)>; "Seized NK Containers Had Chemical Weapons Items," *Dong-a Ilbo*, October 6, 2009, <[english.donga.com/srv/k2srv.php3?biid=2009100636338](http://english.donga.com/srv/k2srv.php3?biid=2009100636338)>; Simeon Kerr and Harvey Morris, "'N Korean Arms for Iran' Seized by UAE," *Financial Times*, August 28, 2009; "3 Held over Export Bid of DPRK Missile Know-How to Myanmar," *Daily Yomiuri*, June 30, 2009; Tony Foley, "Opening Remarks by Acting, Deputy Assistant Secretary of State Tony Foley," PSI Regional Operational Experts Group Meeting, Sopot, Poland, June 22, 2009; UN Panel of Experts, "Report of the Panel of Experts Established Pursuant to Resolution 1874 (2009)," May 2011, p. 28, para. 83; "Cyprus Ponders Fate of Suspected Illegal Weapons Bound for Syria," AP, September 11, 2006; Joby Warrick, "On North Korean Freighter, a Hidden Missile Factory," *Washington Post*, August 14, 2003; Robert Marquand, "Ship's Seizure Sends Warning to N. Korea," *Christian Science Monitor*, August 12, 2003; Huang Kwang-chun, "N. Korean Freighter Urged to Unload Chemical Materials in Kaohsiung," Central News Agency (Taiwan), August 10, 2003; Nicholas Kralev, "US Lets Ship Take Missiles to Yemen; Sees No Law Forbidding Sale of Scuds," *Washington Times*, December 12, 2002; Tom Raum, "Ship Carrying Dozen North Korean Missiles Intercepted in Arabian Sea," AP, December 10, 2002; "Swiss Arrest Libya-Bound Taiwanese Businessman with Scud Parts," AP, April 12, 2000; Nicholas Rufford, "Libyans Smuggled Scuds through UK," *Sunday Times*, January 9, 2000; "India-N. Korean Ship Detained in Kandla," *The Hindu*, July 4, 1999; Julian West, "Pakistani Murder Exposes Nuclear Link," *Sunday Telegraph*, November 1, 1998; "Swiss Blocks N. Korea, China SCUD missile sales to Egypt," AFP, April 7, 1998; "Hong Kong Introduces Bill to Tighten Weapons Control," AFP, April 10, 1997; Stella Lee, "Two Arrested for Inquiry on Howitzer Parts Cargo," *South China Morning Post*, September 21, 1996; Michelle Chin and Glenn Schloss, "Customs Raid Uncovers Huge Haul of Rocket Fuel," *South China Morning Post*, September 18, 1996; "Hong Kong Finds Quantity of North Korean Arms Bound for Middle

East," BBC Summary of World Broadcasts, September 16, 1996 (transcript of Yonhap article); Stella Lee and Glenn Schloss, "Seizure May Back US Claim of Arms Sales," *South China Morning Post*, September 16, 1996; "Taiwan Continues to Detain N. Korean Explosives Bound for Pakistan," DPA, March 11, 1996; "German Firms Allegedly Involved in Syrian-North Korean Weapon Production," BBC Summary of World Broadcasts, January 19, 1993; "Belgium: Arms Hauls Suggest North Korea Replacing Cuba in Angola," IPS, April 14, 1987.